

Transport in animals

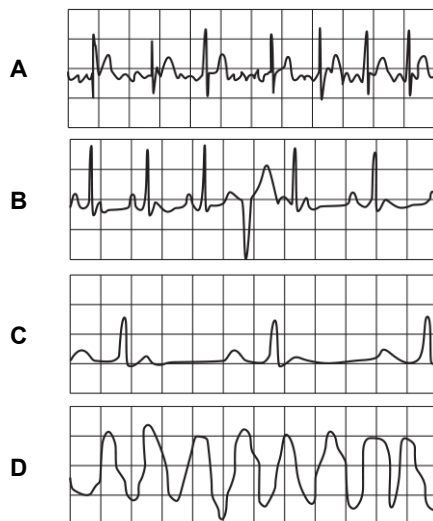
1. Which of the options, **A** to **D**, best describes the chloride shift?

- A** hydrogen carbonate ions and chloride ions moving into red blood cells
- B** hydrogen carbonate ions moving out of red blood cells and chloride ions moving into red blood cells
- C** hydrogen ions being buffered by chloride ions in red blood cells
- D** carbonic anhydrase using chloride ions to produce carbonic acid

Your answer

[1]

2. The ECG traces below show four abnormal heartbeats recorded for six seconds.



Which of the traces, **A** to **D**, shows atrial fibrillation?

Your answer

[1]

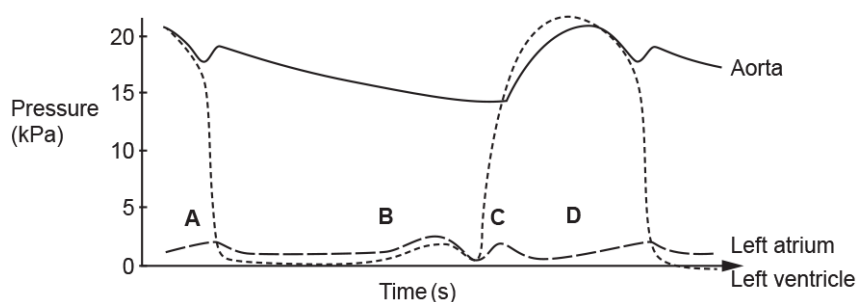
3. The sounds of the heartbeat due to heart valves closing can be described as 'lub-dub'. The 'lub' sound occurs at the beginning of ventricular systole. Which of the options, **A** to **D**, describes what is happening when the 'lub' sound is heard?

- A** semilunar valves opening and blood entering the ventricles
- B** semilunar valves closing and blood entering the ventricles
- C** atrio-ventricular valves opening and blood leaving the ventricles
- D** atrio-ventricular valves closing and blood leaving the ventricles

Your answer

[1]

4. Which of the options, **A** to **D**, on the diagram below shows the time at which the SAN sends out a wave of excitation to initiate a heartbeat?



Your answer

[1]

5. Which of the options, **A** to **D**, would result in the formation of tissue fluid?

- A** hydrostatic pressure < oncotic pressure
- B** hydrostatic pressure = oncotic pressure
- C** oncotic pressure < hydrostatic pressure
- D** oncotic pressure \geq hydrostatic pressure

Your answer

[1]

6. Blood vessels are adapted for their function.

Which of the following statements is / are true?

- Statement 1:** The walls of arteries near the heart contain a lot of elastic fibres so that they can stretch and recoil to maintain blood pressure.
- Statement 2:** The walls of the venules contain little muscle.
- Statement 3:** The walls of arteries contain a lot of muscle fibres to contract and generate pressure in the blood.

- A** 1, 2 and 3
- B** Only 1 and 2
- C** Only 2 and 3
- D** Only 1

Your answer

[1]

7. Which of the statements, **A** to **D**, correctly explains why tissue fluid forms from plasma in capillaries?

- A** hydrostatic pressure > oncotic pressure
- B** oncotic pressure > hydrostatic pressure
- C** osmosis > muscle contractions
- D** solute potential < osmotic pressure

Your answer

[1]

8. The hormone ecdysone is synthesised in the prothoracic glands found in the upper thorax of some invertebrates and is released into haemolymph. It is then transported to cells near the surface of the body and causes the loss of the exoskeleton so that a new exoskeleton can form.

Which of the following statements explains how ecdysone is able to act on cells near the surface of the body?

- 1 Ecdysone is synthesised by specialised neurosecretory cells.
- 2 Ecdysone is soluble in haemolymph because it is a polar molecule.
- 3 Ecdysone is complementary to cell surface receptors on cells throughout the body of some invertebrates.

- A** 1, 2 and 3
- B** Only 1 and 2
- C** Only 2 and 3
- D** Only 1

Your answer

[1]

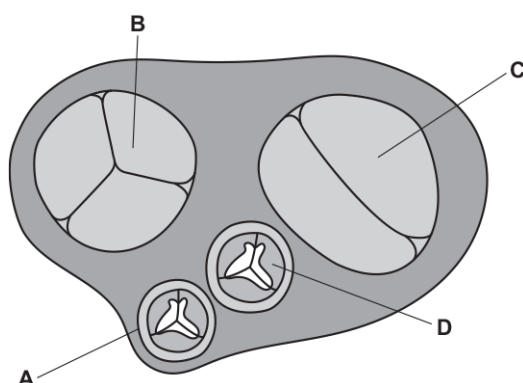
9. Which of the statements, **A** to **D**, explains why diastole follows systole in the mammalian heart?

- A** Cardiac muscle is myogenic.
- B** Cardiac muscle takes a short time to repolarise after being stimulated.
- C** The aorta is capable of maintaining the pressure generated by the left ventricle.
- D** The SAN receives impulses from the AVN.

Your answer

[1]

10. The diagram below shows an internal view of the mammalian heart with the atria removed so valves can be seen.



Which of the valves, labelled **A** to **D**, is pushed open by oxygenated blood entering a ventricle?

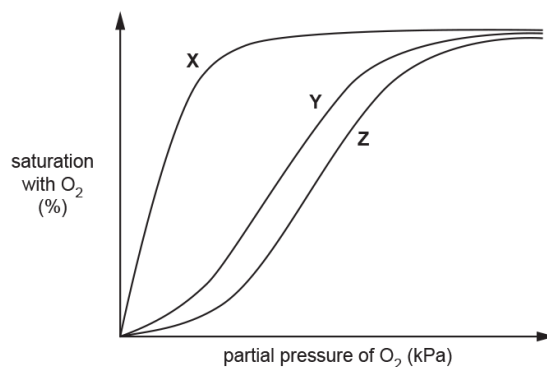
Your answer

[1]

11. Myoglobin is a protein found in muscle. Myoglobin has a very high affinity for oxygen at most partial pressures of oxygen.

The figure below shows dissociation curves for

- Adult
- Fetal haemoglobin
- Myoglobin



Which of the following rows, **A** to **D**, shows the correct labels for the lines on the graph?

| | X | Y | Z |
|----------|-------------------|-------------------|-------------------|
| A | myoglobin | fetal haemoglobin | adult haemoglobin |
| B | fetal haemoglobin | adult haemoglobin | myoglobin |
| C | adult haemoglobin | fetal haemoglobin | myoglobin |
| D | myoglobin | adult haemoglobin | fetal haemoglobin |

Your answer

[1]

12. The table below shows the different percentages of three different components of blood vessels.

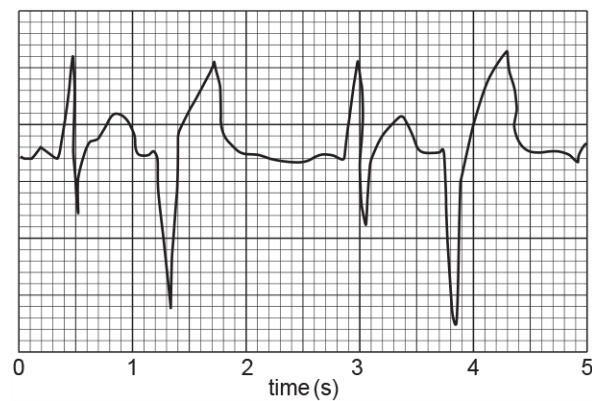
| | elastin (%) | smooth muscle (%) | collagen (%) |
|----------|-------------|-------------------|--------------|
| A | 8 | 33 | 58 |
| B | 17 | 39 | 43 |
| C | 56 | 11 | 33 |
| D | 56 | 45 | 10 |

Which of the rows, **A** to **D**, shows the relative proportions of the components of the aorta?

Your answer

[1]

13. The trace below is an electrocardiogram (ECG) of an abnormal heart activity.



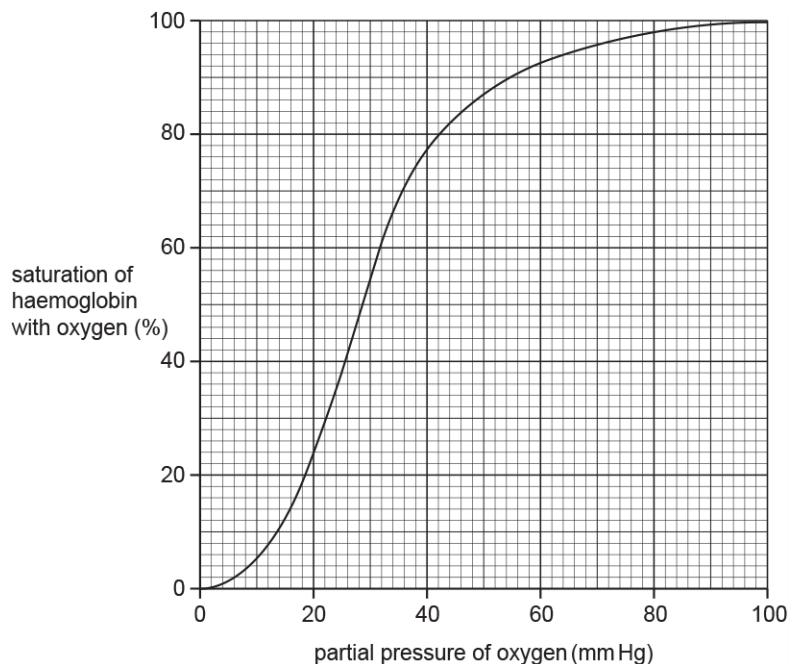
What is the name for this abnormal heart activity?

- A** bradycardia
- B** ectopic heartbeat
- C** fibrillation
- D** tachycardia

Your answer

[1]

14. The graph below shows the oxygen dissociation curve for adult human haemoglobin.



What is the proportion of oxygen molecules released by haemoglobin between 40 mm Hg and 20 mm Hg?

- A 0.31
- B 0.69
- C 2.21
- D 3.21

Your answer

[1]

15. Carbon dioxide release during respiration can affect the % oxygen saturation of haemoglobin.

The tertiary structure of haemoglobin is affected when carbon dioxide reacts with water to form carbonic acid. This reaction releases hydrogen ions.

Which of the statements, **A** to **D**, explains this change?

- A The release of hydrogen ions causes the pH to rise, which reduces haemoglobin's affinity for oxygen.
- B The release of hydrogen ions causes the pH to rise, which increases haemoglobin's affinity for oxygen.
- C The release of hydrogen ions causes the pH to fall, which increases haemoglobin's affinity for oxygen.
- D The release of hydrogen ions causes the pH to fall, which reduces haemoglobin's affinity for oxygen.

Your answer

[1]

16. The aquatic crustacean *Daphnia magna* has a heart that pumps a blood-like liquid called haemolymph around the body cavity.

Which of the statements, **A** to **D**, describes the circulatory system of *Daphnia magna*?

- A** single closed
- B** single open
- C** double open
- D** double closed

Your answer

[1]

17. A student studied the structure of a blood vessel and found:

- an outer layer of collagen fibres,
- a thick middle layer of smooth muscle and elastic tissue,
- an innermost layer of endothelial cells.

Which of the options, **A to D**, identifies the type of blood vessel the student studied?

- A** artery
- B** capillary
- C** venule
- D** vein

Your answer

[1]

18. In the graph below, the top electrocardiogram (ECG) trace shows normal heart activity and the ECG trace below shows abnormal heart activity.



What is the heart condition represented by the bottom ECG trace?

- A fibrillation
- B tachycardia
- C ectopic heartbeat
- D bradycardia

Your answer

[1]

19. Which of the options, **A to D**, is a correct statement about tissue fluid?

- A Tissue fluid carries carbon dioxide to muscle cells.
- B Oncotic pressure in the capillary causes tissue fluid formation from plasma.
- C Hydrostatic pressure in the capillary causes tissue fluid formation from plasma.
- D Tissue fluid is reabsorbed into the capillary by active transport.

Your answer

[1]

20. Which of the following statements correctly describes the mechanism behind water movement between plasma and tissue fluid at the venule end of a capillary?

- A. The hydrostatic pressure is greater than the oncotic pressure so water moves out of the capillary.
- B. The hydrostatic pressure is greater than the oncotic pressure so water moves into the capillary.
- C. The oncotic pressure is greater than the hydrostatic pressure so water moves out of the capillary.
- D. The oncotic pressure is greater than the hydrostatic pressure so water moves into the capillary.

Your answer

[1]

21. When you listen to a human heartbeat through a stethoscope you can hear a two stage 'lub-dub' sound.

Which of the following causes the first 'lub' component?

- A. closing of the atrioventricular valves
- B. sound of blood rushing into the atria
- C. sound of blood rushing into the ventricles
- D. closing of semilunar valves

Your answer

[1]

22. The following events occur when carbon dioxide enters an erythrocyte in a capillary.

1. Hydrogencarbonate ions diffuse into the plasma from the erythrocyte.
2. Dissociation of carbonic acid.
3. Carbon dioxide reacts with water forming carbonic acid.
4. Chloride ions diffuse into erythrocyte from plasma.

In which sequence do they occur?

| | First step \longrightarrow | | | Final step |
|----------|------------------------------|---|---|------------|
| A | 2 | 4 | 1 | 3 |
| B | 3 | 2 | 1 | 4 |
| C | 3 | 1 | 4 | 2 |
| D | 2 | 3 | 4 | 1 |

Your answer

[1]

23. Dissolved material gives rise to oncotic pressure, which is related to water potential, Ψ .

Which of the following shows the typical oncotic and hydrostatic pressures in blood at the arterial and venous ends of capillaries?

| | Pressure (mmHg) | | | |
|----------|---------------------------|-------------|-------------------------|-------------|
| | Arterial end of capillary | | Venous end of capillary | |
| | Oncotic | Hydrostatic | Oncotic | Hydrostatic |
| A | -20 | 13 | -20 | 33 |
| B | -20 | -13 | -20 | 13 |
| C | 20 | 33 | -20 | 13 |
| D | -20 | 33 | -20 | 13 |

Your answer

[1]